FOLDABLE AND PORTABLE MOBILE COMMUNICATION TERMINAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a foldable and portable mobile communication terminal represented by a portable mobile telephone. More particularly, the present invention relates to a foldable and portable mobile communication terminal allowing the processing of operational information according to a program incorporated therein, the processing of communication information with an opposite party, related to the aforementioned operational information processing, and data display therefor

2. Description of the Related Art

As an example of such a foldable and portable mobile communication terminal, the following foldable and portable mobile telephone is known. This foldable and portable mobile telephone includes a lower-side body unit and an upper-side body unit. The lower-side body unit has an operation section comprising a plurality of operation buttons each serving an operational function for users. The upper-side body unit has a display section for displaying data on the operational information processing associated with operation with respect to the operation section, and on the processing of communication information with an opposite party, related to the above-described operational information processing. The lower-side and upper-side units are coupled openably and closably by a hinge mechanism constituted of a single-shaft hinge unit, and are formed into a two-folded type. Such a foldable and portable mobile telephone is disclosed in, for example, Japanese Unexamined Patent Publication (JP-A) No. 2001-136252.

As a hinge mechanism applied to the foldable and portable mobile telephone, the following one is known. This hinge mechanism includes a hinge unit having a first rotating shaft (rotating shaft for opening and closing). By this hinge unit, the upper-side unit is rotated about the first rotating shaft by an angle of approximately 180 degrees with respect to the lower-side unit into an open state. This open state is defined as a talking position. In the case of such a foldable and portable mobile telephone, on the folded surface of the lower-side body unit with respect to the upper-side body unit, a microphone for collecting sounds is usually provided besides the operation section. On the other hand, on the folded surface of the upper-side body unit with respect to the lower-side body unit, a speaker for uttering voices is provided besides the display section.

As described above, in the case of a conventional foldable and portable communication terminal, the open state in which the upper-side body unit has been rotated with respect to the lower-side body unit by an angle of approximately 180 degrees using the hinge unit, is defined as a talking position. This, however, involves a problem in that the usability in the open position is poor. For example, when the user brings his or her ear near to the speaker on the upper-side body unit while talking with an opposite party, his or her mouth moves away from the microphone on the lower-side body unit, and thereby hard talking could be caused. Also, in this open position, the entire communication terminal with the shape thereof lengthened might be a hindrance to the usage thereof. This is because the conventional foldable and portable mobile communication terminal has no function of rotating the upper-side body unit with respect side body unit.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to solve the above-described problems and to provide a foldable and portable mobile communication terminal that facilitates talking by improving the operation of the foldable type, and that provides excellent usability by allowing it to be used with the overall size thereof remained compact.

The present invention is applied to a foldable and portable mobile communication terminal configured as a two-folded type by openably and closably coupling, by a hinge mechanism, a lower-side body unit that includes an operation section comprising a plurality of operation buttons, and an upper-side body unit that includes a display section for displaying data on the operational information processing associated with operation with respect to the operation section, and on the processing of communication information with an opposite party, related to the above-described operational information processing.

According to an aspect of the present invention, the foldable and portable mobile communication terminal has a two-shaft hinge mechanism as a hinge mechanism. The two-shaft hinge mechanism comprises a first hinge unit that allows the upper-side body unit to rotate with respect to the lower-side body unit up to the open position defining a predetermined talking position, and a second hinge unit that allows the first hinge unit to rotate in the direction different from the aforementioned rotational direction of the first hinge unit. The first and second hinge units are coupled so that their rotational center axes orthogonally intersect each other.

In the foldable and portable mobile communication terminal according to the present invention, the first hinge unit is accommodated in the upper-side body unit, and the second hinge unit is accommodated in the lower-side body unit so that a part thereof projects from the lower-side body unit.

In the foldable and portable mobile communication terminal according to the present invention, the first and second hinge units has first and second rotating shafts, respectively. The two-shaft hinge mechanism defines the predetermined talking position by rotating the upper-side body unit about the first rotating shaft, and also allows the upper-side body unit to rotate about the second rotating shaft at a position within the surface of the lower-side body unit in either of the clockwise and counterclockwise directions. In addition, the two-shaft hinge mechanism has tilt-angle adjusting functions of controlling the open tilt-angle of the upper-side body unit according to the rotational angle thereof about the second rotating shaft so as to become an angle defining the predetermined talking position, and an angle formed by the upper-side body unit rotating about the second rotating shaft off the angle defining the predetermined talking position.

In the foldable and portable mobile communication terminal according to the present invention, the tilt-angle adjusting functions of the two-shaft hinge mechanism rotate the upper-side body unit about the first rotating shaft from the closed state in which the rotational angle of each of the first and second rotating shafts is 0 degree, up to the open state, and thereafter, the tilt-angle adjusting functions can set the open tilt-angle for defining the predetermined talking position, in a range of 160 to 170 degrees. Also, the tilt-angle adjusting functions can perform setting such that the upper-side body unit can rotate about the second rotating shaft from the open tilt-angle range of 160 to 170 degrees, in an angle range of 180 degrees in either of the clockwise and counterclockwise directions. When the rotational angle about the second rotating shaft is in a range of 0 to 90